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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,580	07/02/2003	David Henry Gurr	129159	5508

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EXAMINER	
KISH, JAMES M	

ART UNIT	PAPER NUMBER
3737	

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/613,580	GURR ET AL.	
	Examiner	Art Unit	
	James Kish	3737	

-- The MAILING DATE of this c mmunication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-29 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 December 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 1/8/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-9, 19 and 26-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang (US Patent No. 6,828,788). Wang discloses a method and system (Figure 1) of MRI for projection reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). A k-space that is represented in polar coordinates and scanned projection-by-projection is assumed. Each projection in k-space is generated by a phase-coding step of the rotating gradient (column 2, lines 8-37). The MRT image in the image domain is linked to the MRT data in k-space by means of Fourier transformation (column 1, lines 64-67). As seen from Figures 4-8, the k-space is at least two-dimensional; therefore it would require a two-dimensional Fourier transformation to go between k-space and the image domain. However, in order to be able to implement the Fourier transformation that ultimately supplies the actual MRT image, the registered data in k-space must be projected onto a Cartesian grid (column 7, lines 9-12). Figure 7 shows groups of planes of data in k-space with relative angles between said groups.

See column 5, line 62 through column 6, line 16 for discussion on how to achieve high or low resolution in the images.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang alone. Wang discloses a method and system (Figure 1) of MRI for projection reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). The circular sampling pattern illustrated in Figure 4, though not explicitly disclosed, would be computer implemented with code containing a nested loop to acquire the desired k-space locations for each data point.

3. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of either Wu et al. (US Patent No. 6,591,128) or Loncar et al. (US Patent No. 5,500,593). Wang discloses a method and system (Figure 1) of MRI for projection reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). However, Wang does not create a volumetric image.

Wu teaches a MRI system that uses a two- or three-dimensional inverse Fourier transform to create a volumetric image representation of the area being examined (column 6, lines 15-20).

Loncar teaches magnetic resonance signals being received and being demodulated. These signals are then reconstructed into a volume image representation by 3D inverse Fourier transform reconstruction (column 6, lines 50-57).

Therefore, would be obvious to use a 3D inverse Fourier transform to create a volumetric image because, as shown by the above references, it is well known in the art to do so.

4. Claims 11, 13-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Tasaka et al. (US Patent No. 6,515,477). Wang discloses a method and system (Figure 1) of MRI for projection reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). However, Wang does not create a volumetric image. Tasaka teaches the use of a data processor that performs a one-dimensional inverse Fourier transformation to provide projections in a plurality of directions of an imaged object in an actual space and then back-projects the projections to reconstruct a tomographic image. It is also taught that instead of performing the back-projection, that the projections can be gridded, followed by performing two-dimensional inverse Fourier transformation on the data in the grid array (column 6, lines 25-43). It would have been obvious to one having ordinary skill in the art at the time the

invention was made to use these methods to create a volumetric image as an known alternative to the method used by Wang.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Wu et al., further in view of Simonetti (US Patent No. 6,076,042). Wang discloses a method and system (Figure 1) of MRI for projection reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). However, Wang does not create a volumetric image. Wu teaches a MRI system that uses a two- or three-dimensional inverse Fourier transform to create a volumetric image representation of the area being examined (column 6, lines 15-20). However, neither Wang nor Wu teach using maximum intensity projection (MIP). Simonetti uses MIP as a final step before a viewing process in magnetic resonance angiography (MRA). See Abstract, column 2, lines 45-52, as well as Figure 5. Also see column 3, lines 17-22 and column 6, lines 3-13. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use MIP as taught by Simonetti in an MRI displaying step in order to help differentiate between areas of interest and those not of interest in a volumetric image.

6. Claims 18 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Tasaka et al., further in view of Simonetti (US Patent No. 6,076,042). Wang discloses a method and system (Figure 1) of MRI for projection

reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). However, Wang does not create a volumetric image. Tasaka teaches the use of a data processor that performs a one-dimensional inverse Fourier transformation to provide projections in a plurality of directions of an imaged object in an actual space and then back-projects the projections to reconstruct a tomographic image. However, neither Wang nor Tasaka teach using maximum intensity projection (MIP). Simonetti uses MIP as a final step before a viewing process in magnetic resonance angiography (MRA). See Abstract, column 2, lines 45-52, as well as Figure 5. Also see column 3, lines 17-22 and column 6, lines 3-13. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use MIP as taught by Simonetti in an MRI displaying step in order to help differentiate between areas of interest and those not of interest in a volumetric image.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Kuhara et al. (US Patent No 5,722,409). Wang discloses a method and system (Figure 1) of MRI for projection reconstruction by exciting nuclear spins and measuring RF signals in the form of projection datasets and under-scanning of k-space (see Abstract). However, Wang uses a circular k-space sampling pattern. Kuhara shows in Figure 22A and 23A a different possibility for arranging the acquired data within k-space. It is known in the art that k-space can be sampled in many patterns and would

be obvious to one having ordinary skill in the art to use a particular pattern for specific results depending on the application of imaging being performed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Kish whose telephone number is 571-272-5554. The examiner can normally be reached on 8:30 - 5:00 ~ Mon. - Fri..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMK

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